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MACHINERY REPLACEMENT DECISIONS

Guidelines and Resource Materials for Educational Meetings

by

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A MULTITUDE OF REASONS FOR REPLACING FARM EQUIPMENT

Service
Technology
Breakdown
Price
Availability

Equipment Size
Status
Dealer Incentives
Farming System
Repair Cost

Complementarity
Reliability
Salesperson
Tax Management
Operator Ability

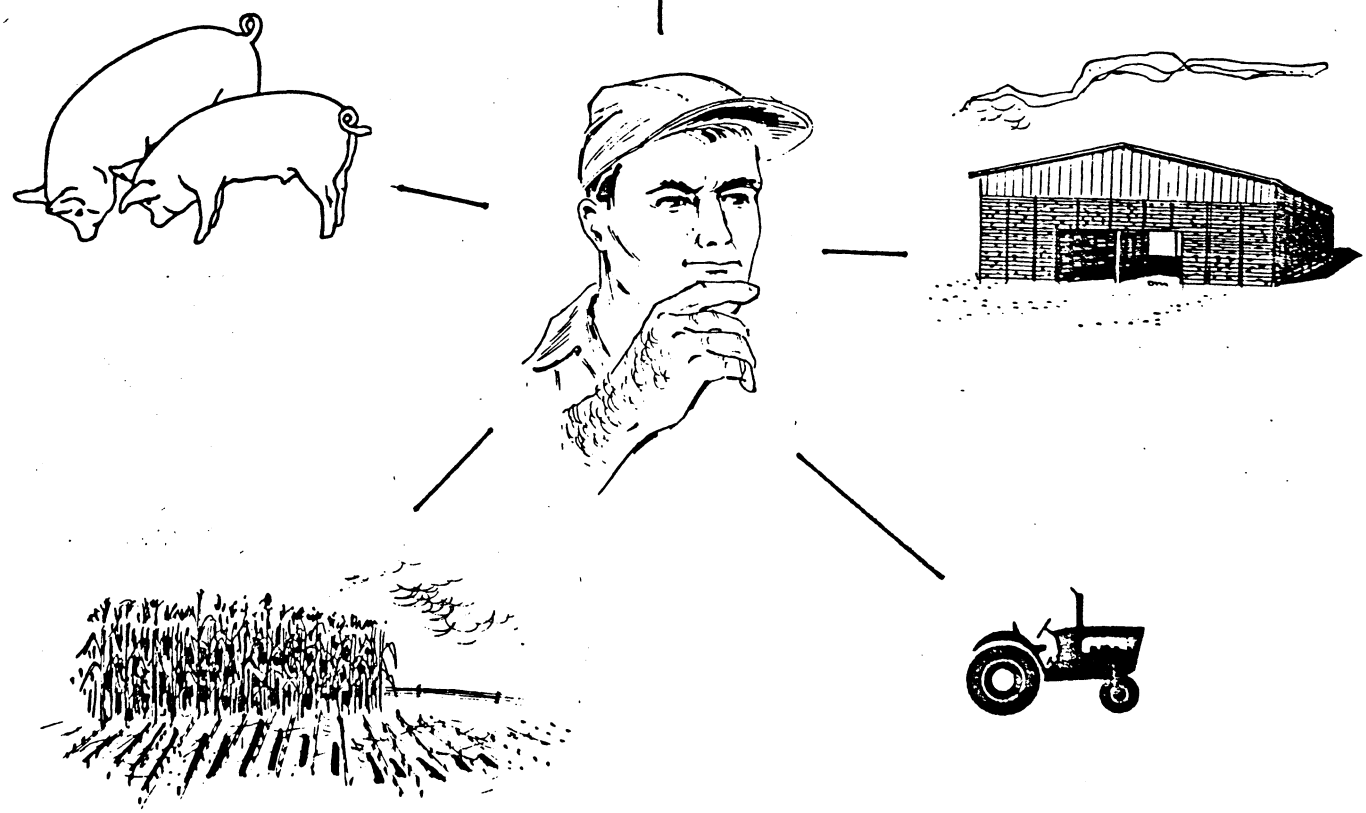
Desire
Farm Size
Farm Type
Cash Flow
Personnel

Labor Availability
Capital Availability
Personal Satisfaction
New Paint Disease
(and others)

RISKS

DECISIONS

ALTERNATIVES



FARMERS ARE ENTREPRENEURS

SITUATION

FARM MACHINERY PURCHASES AND DEPRECIATION, U.S. 1960 - 1987

YEAR	PURCHASES	DEPRECIATION[a/]	NET CHANGE
	- - billion dollars- -		
1960-64[b/]	2.0	3.2	-1.2
1965-69[b/]	2.4	4.0	1.6
1970-74[b/]	6.3	5.5	.8
1975	8.7	8.4	.3
1976	10.0	9.5	.5
1977	10.6	10.5	.1
1978	12.7	11.4	1.3
1979	14.3	12.9	1.4
1980	12.8	14.1	1.3
1981	12.1	15.6	3.5
1982	9.5	16.3	-6.8
1983	9.5	16.2	-6.7
1984	9.3	15.6	-6.3
1985	7.4	14.3	-6.9
1986	6.4	13.0	-6.6
1987(est)	5.8	12.0	-6.2

a/ Current replacement values
b/ Annual averages for period

OVER-EQUIPPING OF 70'S AND EARLY 80'S HAS BEEN LONG USED UP

FARM TRACTOR, HORSEPOWER, COMBINE AND EQUIPMENT INVENTORY

U.S. 1960 - 1987

Year	Tractor No.	Tractor H.P.	Combine Number	Total Equipment
	--million--		thousand	bill. $
60-64	4.8	162	968	19.9
65-69	4.8	188	866	25.6
70-74	4.5	210	790	30.0
1975	4.5	222	524	57.2
1976	4.4	228	527	63.1
1977	4.4	232	535	69.6
1978	4.8	259	655	75.5
1979	4.8	301	655	85.8
1980	4.8	304	652	93.1
1981	4.7	306	650	101.4
1982	4.7	306	647	102.0
1983	4.7	309	644	100.8
1984	4.7	311	644	96.9
1985	4.7	311	645	87.7
1986	4.6	311	643	80.4
1987est	4.6	312	643	75.0

EQUIPMENT AVAILABLE BUT AGING

FARM MACHINERY REPAIR
U.S. 1960-1987

	Total Expense billion $	Percent of Inventory Value	Percent of Machinery Purchase
1960-64	1.6	8.2	82
1965-69	1.7	6.8	73
1970-74	2.3	6.2	37
1975	3.4	6.0	39
1976	3.9	6.1	39
1977	4.2	6.1	40
1978	4.5	6.0	36
1979	5.2	6.0	36
1980	5.2	5.6	41
1981	5.3	5.2	44
1982	4.6	4.5	49
1983	4.8	4.8	50
1984	4.9	5.1	53
1985	4.8	5.5	65
1986	4.8	6.0	75
1987 (est)	5.0	6.7	86

CURRENT REPAIR ACTIVITY APPEARS NORMAL
HOWEVER
NORMAL HAS CHANGED

IMPLICATIONS

LENGTHENED TRADING INTERVAL

- Have Big Tractors With Equipment
- Already Lost Most of Value
- Won't Lose Much More
- Low Hours
- Choose Not to Trade

SLOW ADOPTION OF ALTERNATIVE TILLAGE

- Increase Returns
- Need New Equipment
- Present Equipment "Cheap" To Use
- Not Adopt New System

FACTORS AFFECTING MINIMUM COST YEAR TO TRADE

* Loss in Value

* Expected Repairs

* Downtime Charges

* Income Tax

* Inflation

* Cost of Capital

* Transaction Costs

* Annual Hours of Use

* Penalty For Early/Late Trade

LOSS IN VALUE

Year End Values

Percent of List Price

Year	Tractors	Combines	Other
0*	68	64	60
1	63	57	53
2	58	50	47
3	53	44	42
4	49	39	37
5	45	35	33
6	41	31	29

1986 ASAE Standards

* After transaction cost market value

Annual Declines in Value

Tractors	8.0%
Combines	11.5%
Other	11.5%

REPAIR RATES

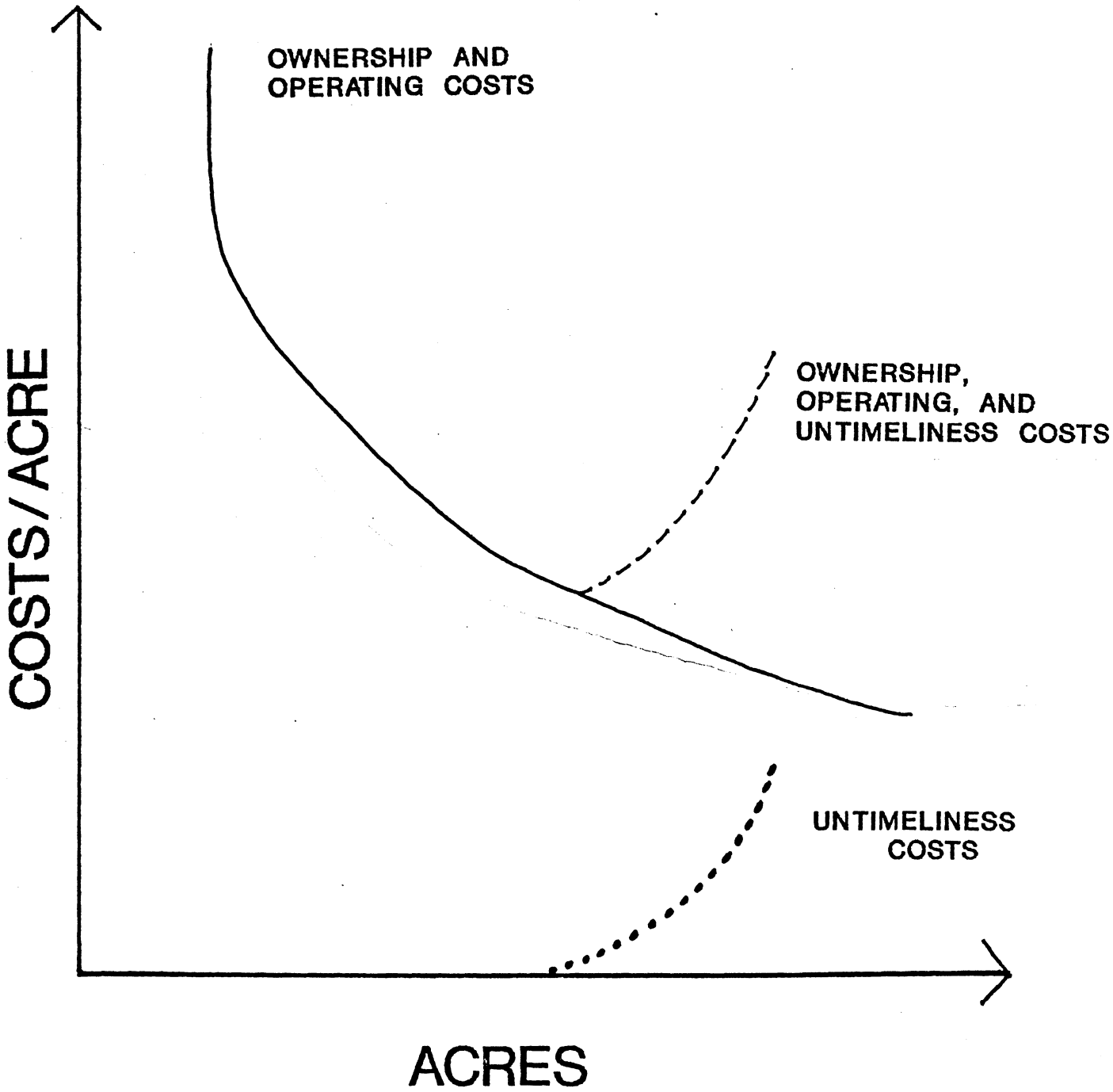
CUMULATIVE REPAIRS
$ Per $1000 List Price

	Tractors				
Hours	2WD	4WD	Combine	Planter	Disc
200	--	--	4	18	12
600	4	4	41	185	76
1000	12	10	120	540	180
1400	24	20	243	1095	319
1800	39	32	412	1856	489

1986 ASAE Standards

CONCERN ABOUT HIGH REPAIR COSTS WILL LIKELY CAUSE PLANTERS TO BE TRADED AFTER LESS USE THAN TRACTORS

DOWNTIME COSTS



DOWNTIME

EFFECT OF DOWNTIME COST ON BEST YEAR TO TRADE

	Tractor	Combine	Planter
Annual Hours	350	250	125
Downtime Charge	0%	0%	0%
Min. Cost Year	20	8	8
Downtime Charge	50%	12%	100%
Min. Cost Year	16	7	5
Downtime Charge	100%	25%	200%
Min. Cost Year	12	6	4

Downtime charge = % of repair cost
Purchase price = 85% list; 4% inflation
11% cost of capital; 15% marg. tax rate

"LACK OF SPECIFIC DATA"
! CONCEPTUALLY SOUND, HOWEVER !

INCOME TAX RATE

Effect of Tax Rates on Best Year to Trade Combine

	Tax Rate (%)		
	0	15	30
Downtime	12%	12%	12%
Min. Cost Year	7	7	8

Purchase @ 85% list; 250 hours per year
4% Inflation; 11% Capital Cost

TAX RATE HAS ALMOST NO EFFECT.

CAPITAL COST AND INFLATION

EFFECT OF CAPITAL COST AND INFLATION ON BEST YEAR TO TRADE COMBINE

Inflation (%)	0	4	4	0	4
Capital Cost (%)	4	4	8	8	11
Min. Cost Year	7	7	7	7	7

Purchase @ 85% list; 250 hours per year
15% marginal tax rate; 12% downtime charge

MINIMUM COST YEAR CONSTANT

TRANSACTION COST

EFFECT OF PURCHASE PRICE ON BEST YEAR TO TRADE COMBINE

	Purchase Price % of List			
	75	85	90	100
Min. Cost Year	5	7	8	9

250 hours annual use; transaction price = 64% list; 12% downtime charge; 4% inflation; 11% capital cost; 15% marg. tax rate; normal loss in value

SHARPER "DEALIN'" ENCOURAGES EARLIER "TRADIN'"

ANNUAL HOURS OF USE

EFFECT OF ANNUAL USE ON BEST YEAR TO TRADE

	Tractor	Combine	Planter
Downtime Charge	0	12%	100%
Annual Hours	200	150	100
Min. Cost Year	20	15	6
Annual Hours	400	250	125
Min. Cost Year	10	7	5

Purchase @ 85% list; 4% inflation
11% capital cost; 15% marginal tax rate

INCREASED USEAGE DECREASES TRADE TIME

PENALTY FOR EARLY/LATE TRADE

EFFECT ON ANNUAL COST
OF TRADING EARLY/LATE

COMBINE

YEAR		EXTRA COST
1		$13,400
2		4,400
3		4,100
4		3,300
5		2,300
6	4-Year	0
7	Window	400
8		2,000
9		3,700

List price $100,000; Purchase at 85% list; 250 hours use; Downtime charge 25%
4% inflation; 11% capital cost;
15% marginal tax rate

NEED BIGGER --- TRADE EARLY

CASH FLOW PROBLEM --- DELAY TRADE

REASONABLE ASSUMPTION TRADE TIMES

	Annual Hours	Downtime Cost Factor	Minimum Cost Yr.
Tractor	400	50	13
Planter	120	100	5
Combine	250	12	7
Other	250	0	11

Purchase 85% list; 4% inflation
11% capital cost; 15% marginal tax rate

"Tradin'" Guidelines

Tractors	12 - 14 years
Planters	4 - 6 years
Combines	6 - 8 years
Other	10 - 12 years

KEEP IN MIND
MANY OTHER REASONS FOR TRADING

SUMMARY

NUMEROUS FACTORS AFFECT REPLACEMENT DECISIONS

MINIMUM COST TRADE YEARS (+/- a year)	
Tractors	10+
Planter	5
Combine	7
Other	10+

TRADING EARLIER LIKELY FOR PRODUCTIVITY OR SIZE REASONS

VARIABLES AFFECTING TRADE TIME

Repairs	Purchase Price
Annual Use	Downtime Cost

4-YEAR TRADE TIME WINDOW